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| APPLICATION NO.   | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|---|-------------|----------------------|---------------------|------------------|
| 10/673,722  | 09/29/2003  | David Haase          | EMC-03-103          | 2465             |
| 24227   | 7590        | 12/02/2005           | EXAMINER            |                  |
| EMC CORPORATION<br>OFFICE OF THE GENERAL COUNSEL<br>176 SOUTH STREET<br>HOPKINTON, MA 01748 |             |                      | FARROKH, HASHEM     |                  |
|   |             | ART UNIT             | PAPER NUMBER        | 2187             |

DATE MAILED: 12/02/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

|                              |                            |                  |
|------------------------------|----------------------------|------------------|
| <b>Office Action Summary</b> | Application No.            | Applicant(s)     |
|                              | 10/673,722                 | HAASE ET AL.     |
|                              | Examiner<br>Hashem Farrokh | Art Unit<br>2187 |

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

#### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

#### Status

- 1) Responsive to communication(s) filed on 29 September 2003.
- 2a) This action is FINAL.                    2b) This action is non-final.
- 3) Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

#### Disposition of Claims

- 4) Claim(s) 1-46 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) Claim(s) \_\_\_\_\_ is/are allowed.
- 6) Claim(s) 1,2,5,10-12,21-24,27,32-34 and 43-46 is/are rejected.
- 7) Claim(s) 3,4,6-9,13-20,25,26,28-31 and 35-42 is/are objected to.
- 8) Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

#### Application Papers

- 9) The specification is objected to by the Examiner.
- 10) The drawing(s) filed on 29 September 2003 is/are: a) accepted or b) objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

#### Priority under 35 U.S.C. § 119

- 12) Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
  - a) All    b) Some \* c) None of:
    1. Certified copies of the priority documents have been received.
    2. Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
    3. Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

#### Attachment(s)

- |   |   |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)   | 4) <input type="checkbox"/> Interview Summary (PTO-413)                     |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                                    | Paper No(s)/Mail Date. _____.   |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date _____. | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
|   | 6) <input type="checkbox"/> Other: _____.                                   |

*The instant application having application No. 10/673,722 has a total of 46 claims pending in the application; there are 3 independent claims and 43 dependent claims, all of which are ready for examination by the examiner.*

**INFORMATION CONCERNING CLAIMS:**

***Specification***

*The disclosure is objected to because of the following informalities:*

1. *Page 2, lines 16-17 and 19-20 recite: "...U.S. Patent Application Serial No. To Be Determined..." The specification needs to be amended to include the assigned Application Serial No.*

*Appropriate correction is required.*

**INFORMATION CONCERNING CLAIMS:**

***CLAIM OBJECTION***

*Claims 1, 23, 27-28, 43 and 45 are objected to because of the following informalities:*

2. *There is a misspelling in the word "queing..." in line 11 of claim 1, line 11 of claim 23, and line 14 of claim 45. The correct spelling is queuing.*
3. *Claims 27-28 recite: "...during steps of claims 1 and 2." Claims 27-28 are system claims; claims 1-2 are method claims. The dependency of a system claim from a method claim is improper.*

*Appropriate correction is required.*

4. *Claim 43 recite: "The system of claim 1..." Claim 43 is a system claim; claim 1 is a method claim. The dependency of a systems claim from a method claim is improper. Appropriate correction is required.*

### **CLAIM REJECTION**

#### ***Claim Rejections - 35 USC § 112***

*The following is a quotation of the second paragraph of 35 U.S.C. 112:*

*The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.*

*Claims 1, 10, 13, 16, 23, 32, 35, 38 and 45 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.*

5. *Claims 1, 23, and 45 recite the limitation "...the source..." in lines 1-2 of claim 1, line 1 of claim 23, and line 2 of claim 45. There is insufficient antecedent basis for this limitation in the claims.*

6. *Claims 1, 23, and 45 recite the limitation "...the clone..." in line 5 of claim 1, lines 4-5 of claim 23, and lines 6-7 of claim 45. There is insufficient antecedent basis for this limitation in the claims.*

7. *Claims 1, 23, and 45 recite the limitation "...the data content..." in line 5 of claim 1, line 5 of claim 23, and line 7 of claim 45. There is insufficient antecedent basis for this limitation in the claims.*

8. *In regard to claims 10, 13, 16, 32, 35, and 38 the expression "...extents of the clone that may be different from the clone and the source" is unclear. The specification does not explain this limitation. The Examiner has searched the specification but has*

*not been able to find a definition of this limitation. The Examiner appreciates if the Applicant indicates where in the specification the above limitation explained (e.g., for pointing to page and line numbers). In addition the expression "may be" is an indefinite term.*

*A clarification/correction is required.*

### ***Claim Rejections - 35 USC § 103***

*The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:*

*(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.*

*Claims 1, 2, 5, 10-12, 21-24, 27, 32-34, and 43-46 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent No.6,898,681 B2 to Young in view of U.S. Patent No.5,455,932 to Major et al. (hereinafter Major) and U.S. Patent Publication No. 2003/0204510 A1 to Ball et al. (hereinafter Ball).*

9. *In regard to claim 1, Young teaches:*

"In a data storage environment having a first volume of data denominated as the source being stored on a data storage system (**column 4, lines 11-15; element 6 in Fig. 1**), and a second volume of data denominated as the clone and which has data content that is a copy of the data content of the source In a data storage environment having a first volume of data denominated as the being stored on the data storage system or on another data storage system (**column 4, lines 11-15; element 8 in Fig. 1**), a method of processing a host computer's request to write data to the source during a restoration of

the source, the method comprising the steps of:” (**e.g., see column 1, lines 61-64; column 7, lines 30-38; element 4 in Fig. 1**). For example the master store or volume represents the first volume and shadow store or volume represents the clone volume recited in the claim. The shadow store contains the point in time copy of master data, which is used for controlling, or managing data during the restoration of the master or the source. When data is overwritten, a new point in time copy is created and the previous point time is protected (**e.g., not overwritten**).

“restoring the source by copying data content from the clone to overwrite the data content of the source;” (**e.g., see column 11, lines 55-62**). Young further teaches: “... host computer requests to write or read data for the source that involve data that is being restored from the clone to the source ...” (**e.g., see column 6, lines 31-35; column 10, lines 7-32**).

“copying any data needed to service the host computer requests to write or read data for the source...” (**e.g., see column 6, lines 31-35**). However, Young does not expressly teach: “queuing in memory...; ...copy-on-demand...”

Major teaches: “queuing in memory...;” (**e.g., see column 4, line 8**) for writing requests in the request queue.

Ball teaches: “...copy-on-demand...” (**e.g., see paragraph 22, in page 3**) for using copy-on-demand technique.

Disclosures by Young, Major, and Ball are analogous because all references teach managing storage system.

*At the time of invention it would have been obvious to a person of ordinary skill in art to modify the storage system taught by Young to include the run-time access techniques disclosed by Ball and the fault-tolerant backup system taught by Major.*

*The motivation for including the run-time access as taught by paragraph 22, page 3 of the Ball is that the access to an image may be granted substantially immediately. This can make the image available to target users substantially faster than the prior techniques. Furthermore, the motivation for including the fault-tolerant backup system as taught by column 2, lines 33-34 of the Major is to provide an improved backup system for network server operation.*

*Therefore, it would have been obvious to include teachings of Ball and Major into Young to obtain the invention as specified in the claim.*

10. *In regard to claim 23, Young teaches:*

*"A system (column 22, lines 24-26) for processing a host computer's request to write data to the source during a restoration of the source (column 10, lines 7-32), the system comprising:"*

*"a data storage system having a first volume of data denominated as the source being stored on a data storage system (column 4, lines 11-15; element 6 in Fig. 1), and a second volume of data denominated as the clone and which has data content that is a copy of the data content of the source being stored on the data storage system or on another data storage system; and" (e.g., see column 4, lines 11-15; element 8 in Fig. 1).*

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"computer-executable program logic configured for causing the following computer-executed steps to occur:" (e.g., see column 25, lines 1-31; column 27, lines 38-46).

"restoring the source by copying data content from the clone to overwrite the data content of the source;" (e.g., see column 11, lines 55-62). Young further teaches: "... host computer requests to write or read data for the source that involve data that is being restored from the clone to the source ..." (e.g., see column 6, lines 31-35; column 10, lines 7-32).

"copying any data needed to service the host computer requests to write or read data for the source..." (e.g., see column 6, lines 31-35). However, Young does not expressly teach: "queuing in memory...; ...copy-on-demand..."

Major teaches: "queuing in memory...;" (e.g., see column 4, line 8) for writing requests in request queue.

Ball teaches: "...copy-on-demand..." (e.g., see paragraph 22, in page 3) for using copy-on-demand technique.

11. In regard to claims 2 and 24 Young teaches:

"preserving the data content of the clone by not allowing it to be overwritten by host writes during the restoring step." (e.g., see column 1, lines 61-64; column 20, lines 4-7). For example whether to overwrite or protect the point in time copy is user's selectable.

12. In regard to claims 5 and 27 Young teaches:

"Wherein a map denominated as a protected restore map is used to track those extents that are modified due to host write requests during the steps of claim 1 and 2." (e.g.,

**see column 8, lines 22-40; Fig. 6a).** For example when a block in the master store is overwritten (e.g., modified), a corresponding bit in the shadow bit map is set to logic 1.

13. In regard to claims 10 and 32 the Examiner was not able to understand what the Applicant means by the expression: "...extents of the clone that may be different from the clone and the source". The Examiner search the specification to find support for this limitation, but was unable to find explanation of this limitation. In the following rejection of these claims, the examiner assumes "...extents of the clone that may be different between the clone and the source" (emphasis added).

Referring again to claims 10 and 32 Young teaches:

"wherein a map denominated as a clone delta map is used to track extents of the clone that may be different from the clone and the source." (e.g., **see column 8, lines 22-40; Fig. 6a).** For example copy bit map which represent clone delta map recited in the claim is used to track the data blocks which are different between the master and shadow stores. A logic 1 in the copy bit map indicates that the corresponding data in the master store is different from the shadow store. When data copied from the master to the shadow store the corresponding bit in the copy bit map is being set to a logic 0 indicating that both master store and shadow store contain identical data

14. In regard to claim 11 and 33, Young teaches:

"wherein the clone delta map is used to copy only extents that are different between the clone and its source during the restoring step." (e.g., **see column 10, lines 50-53; column 14, lines 26-31; Fig. 5a).** For example setting of a bit in the bit map (e.g., a "logic 1") indicates that its corresponding data block in the shadow store is different from

*the one in the master store. The data blocks that have their corresponding bits in the bit map set will be copied to the master store during the restoration or recovery.*

15. *In regard to claims 12 and 34 Young teaches:*

*"wherein the protected restore map is coordinated with the clone delta map for efficient processing of requests to write data to the source." (e.g., see column 6, lines 66-67; column 7, lines 1-43; Fig. 5a-5e). For example the shadow bit map coordinated with the copy bit map for efficient of processing of write data to the master store.*

16. *In regard to claims 21-22 and 43-44 Young teaches:*

*"wherein the source and the clone are each represented by respective first and second logical units." (column 2, lines 35-40; column 4, lines 11-15). For example Young teaches that that a plurality of volumes are grouped together as a single logical device (e.g., source logical unit). The point in time copy of logical device is stored in shadow storage, which is in separate volumes, or logical device, which represents the clone logical unit recited in the claim.*

17. *In regard to claim 45, Young teaches:*

*"A program product (e.g., see column 4, lines 15-19) for use in a data storage environment and being related to processing a host computer's request to write data to the source during a restoration of the source (e.g., see column 10, lines 7-20), wherein the data storage environment includes:"*

*"a data storage system (Fig. 1) having a first volume of data denominated as the source being stored on a data storage system (column 4, lines 11-15; element 6 in Fig. 1), and a second volume of data denominated as the clone and which has data content that*

is a copy of the data content of the source being stored on the data storage system or on another data storage system;" (e.g., see column 4, lines 11-15; element 8 in Fig. 1).

"the program product includes computer-executable logic (element 4 in Fig. 1) contained on a computer-readable-medium (e.g., see column 30, lines 22-24) and which is configured for causing the following computer-executed steps to occur:" "restoring the source by copying data content from the clone to overwrite the data content of the source;" (e.g., see column 11, lines 55-62). Young further teaches: "... host computer requests to write or read data for the source that involve data that is being restored from the clone to the source ..." (e.g., see column 6, lines 31-35; column 10, lines 7-32).

"copying any data needed to service the host computer requests to write or read data for the source..." (e.g., see column 6, lines 31-35). However, Young does not expressly teach: "queueing in memory...; ...copy-on-demand..."

Major teaches: "queueing in memory...;" (e.g., see column 4, line 8) for writing requests in request queue.

Ball teaches: "...copy-on-demand..." (e.g., see paragraph 22, in page 3) for using copy-on-demand technique.

18. In regard to claim 46 Young teaches:

"computer-executable logic (element 4 in Fig. 1) contained on the computer-readable medium (e.g., see column 30, lines 22-24) and which is configured for causing the following computer-executed step to occur:"

"preserving the data content of the clone by not allowing it to be overwritten by host writes during the restoring step." (e.g., see column 1, lines 61-64; column 20, lines 4-7).

### **ALLOWABLE SUBJECT MATTER**

*Claims 3-4, 6-9, 13-20, 25-26, 28-31, 35-42 are objected to as being dependent upon rejected based claims, but would be allowable if rewritten in correct and independent form including all of the limitations of the base claim and any intervening claims.*

1. *The primary reason for allowance of claims 3-4, 6-9, 13-20, 25-26, 28-31 and 35-42 in instant application is the combination with the inclusion of the following limitations:*  
**wherein a map denominated as a copy on demand map is used to track extents being copied during the restoring step and the copy on demand map is used to coordinate the restoring and the copy on demand steps to avoid data corruption.**

### **: IMPORTANT NOTE :**

*If the applicant should choose to rewrite the independent claims to include the limitations recited in either one of the claims, the applicant is encouraged to **amend the title of the invention** such that it is descriptive of the invention as claimed as required be sec. **606.01** of the **MPEP**. Furthermore, the **summary of invention** and the **abstract** should be amended to bring them into harmony with the allowed claims as required by paragraph 2 of sec. **1302.01** of the **MPEP**.*

*As allowable subject matter has been indicated, applicant's response must either comply with all formal requirements or specifically traverse each requirement not compiled with. See 37 C.F.R. § 1.111(b) and § 707.07(a) of the M.P.E.P.*

### ***Conclusion***

*The prior art made of record and not relied upon are as follows:*

1. U. S. Patent No. 6,662,268 B1 to McBrearty et al. describes System and method for striped mirror re-synchronization by logical partition rather than stripe units.
2. U. S. Patent Publication No. US 2004/0267822 A1 to Curran et al. describes Rapid restoration of file system usage in very large file systems.
3. U. S. Patent Publication No. US 2003/0051109 A1 to Cochran describes Method and system for providing logically consistent logical unit backup snapshots within one or more data storage devices.

*Any inquiry concerning this communication should be directed to Hashem Farrokh whose telephone number is (571) 272-4193. The examiner can normally be reached Monday-Friday from 8:00 AM to 5:00 PM.*

*If attempt to reach the above noted Examiner by telephone are unsuccessful, the examiner's supervisor, Mr. Donald A Sparks, can be reached on (571) 272-4201. Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published application may be obtained from either private PAIR or Public PAIR. Status information for unpublished application is available through Private PAIR only. For more information*

*about PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBS) at 866-217-9197 (toll-free).*

HF  
HF

2005-01-10



DONALD SPARKS  
SUPERVISORY PATENT EXAMINER